AMENDED SPECIFICATION

Reprinted as amended in accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated the twentyseventh day of August, 1947, under Section 21, of the Patents and Designs Acts, 1907 to 1946.

PATENT SPECIFICATION

546,775

Application Date: June 12, 1941. No. 7435/41.
„ „ Feb. 20, 1942. No. 2264/42.

One Complete Specification left (under Section 16 of the Patents and Designs Acts, 1907 to 1939): June 10, 1942.

Specification Accepted: July 29, 1942.

PROVISIONAL SPECIFICATION
No. 7435 A.D. 1941.

Improvements in Closure Caps for Fuel Tanks and like Containers

We, THOMAS CARLYLE ELLISON ROWLAND, a British Subject, of 49, Silhill Hall Road, Solihull, in the County of Warwick, and HARRY PARKER, a British Subject, of 71, Hazelhurst Road, Kings Heath, Birmingham, in the County of Warwick, do hereby declare the nature of this invention to be as follows:—

This invention relates to closure caps primarily for the filler openings of tanks such for instance as vehicle radiator tanks and vehicle fuel tanks.

The object of the present invention is to provide an improved construction.

A closure cap according to the present invention comprises a compound structure including a sealing ring adapted to engage with the neck of the opening, a cap rotatably mounted in the ring, adapted to seat thereon, and having a shank extending therethrough, a locking member mounted on the shank so that it turns therewith but can slide thereon, and a spring acting between the locking member and an abutment on the shank, the locking member being adapted to engage under lugs projecting inwardly in the neck of the opening with a cam action when the cap is turned in the appropriate direction so as to move the locking member axially and cause the spring to press the cap and the sealing ring to form pressure engagement with their seatings.

When fastening the closure and also when unfastening it the locking member preferably moves against a definite stop so that the operator can tell when the fastening or unfastening movement is complete. In the one case the stop may be formed on the operative parts of the locking member coming into engagement with the sides of the lugs in the neck of the opening and in the other case the operative parts of the locking member come into engagement with projections provided on the underside of the sealing ring.

The sealing ring is preferably hinged to the neck of the opening but preferably the hinge permits floating movement of the sealing ring in an axial direction so that the sealing ring can press evenly with uniform pressure around the seating provided on the neck of the opening.

In one construction the neck of the opening is of cylindrical form and its edge is machined and forms a seating adapted to be engaged by a rubber or other ring carried by the sealing ring.

The neck of the tank opening is further provided with an exterior lug through which extends a slot the centre line of which is parallel to the axis of the neck the slot extending horizontally through the lug and receiving a pin carried by a pair of lugs on the sealing ring the arrangement being such that the sealing ring can pivot on a horizontal axis but the axis is movable up and down to a limited extent so that the sealing ring can seat itself accurately on the edge of the neck.

The neck of the tank opening is further provided with a plurality say, three inwardly projecting lugs. These lugs are situated all on the same level and are spaced equally around the wall of the neck. Further they are situated a short distance below the edge of the neck. Each of these lugs in the plan view has one side which is substantially radial and

[*Price* 1/-]

the opposite side may converge towards the radial side proceeding inwardly. The radial side of each of these lugs is adapted to be engaged by an operative part on the locking member and to form a stop therefor when the closing movement is complete.

On the underside of each lug a somewhat convex or rounded projecting rib is provided these ribs being arranged radially and being adapted to be engaged by cam surfaces forming the operative parts of the locking member.

The sealing ring is formed as a metal ring having a pair of lugs at a suitable position carrying a pivot pin engaging in the slot in the lug on the exterior of the neck.

On its underside the sealing ring is provided with an annular groove of rectangular section which receives a packing ring of synthetic rubber or other suitable material. The metal sealing ring is provided with a flange adjacent the groove which receives the rubber ring which flange engages under the inner periphery of the rubber ring and retains it in position. The packing ring is thus housed in the metal sealing ring so that it cannot come loose and both its inner and outer edges are supported by the inner and outer edges of the annular groove in the metal sealing ring. A portion of the undersurface of the packing ring is exposed and engages with the edge of the neck on the tank.

The metal sealing ring is further provided with a central cylindrical opening and on its under side this metal sealing ring is provided with a plurality of lugs projecting downwardly which form stops for the locking member when it is moved to the released position.

Rotatably mounted in the central opening in the sealing ring is a cap. This cap is constructed with a flange at the top, the periphery of which may be shaped with finger grooves so that it can be gripped firmly for turning. This cap is provide with a central downwardly extending hollow shank the middle part of which is of non-circular, say square, section. This shank is provided with a vertical slot extending from its lower end upwardly to a suitable shoulder.

Further, on its under side the flange of the cap is provided with a rectangular groove which receives a packing ring which may be made of graphited asbestos. This packing ring is adapted to engage the upper side of the sealing ring in addition to the seal between the sealing ring and the edge of the neck.

The locking member may be formed as a spider having a number of radially extending arms the number corresponding with the number of lugs provided in the neck of the tank opening.

The locking member is slidably mounted on the shank of the cap and at its upper side it is provided with a bridge portion which enters the slot in the shank of the cap this bridge portion on its underside having a central projection for positioning the spring.

Each of the arms of the locking member or spider has a cam surface on its upper side and each cam presents to the rib on the underside of the corresponding neck lug, first an incline and then a slight declivity and finally a definite stop formed by a radial rib on the arm of the locking spider. Thus when the spider is turned so as to engage under the neck lugs the locking spider is drawn downwardly until a definite stop position is reached in which each declivity is engaged by one of the ribs on the undersides of the lugs on the neck.

The fit of the locking member on the shank is preferably a slack fit so as to allow the locking member a limited floating or slight rocking movement permitting all the cam surfaces properly to engage their lugs.

After the locking spider has been placed in position on the shank a coiled spring is placed in the shank the upper end of the spring engaging the underside of the bridge portion of the locking member or spider.

A plug is inserted in the lower end of the hollow shank of the cap and forms an abutment for the lower end of the spring. This plug may be provided with a central projection on its upper side for positioning the spring and the plug may be retained in position by a cross pin.

With the arrangement described if the compound structure including the sealing ring, cap and locking member or spider is turned into the closed position and the cap given a part turn the arms of the locking spider engage under the lugs in the neck so that the locking spider is drawn downwardly thus loading the spring. The load of the spring is transmitted to the shank of the cap because the lower end of the spring engages the plug in the hollow shank of the cap and in this way the cap and the sealing ring are drawn downwardly resiliently causing their packing rings to engage their respective seatings.

When unfastening the closure the cap is given a part turn in the reverse direction until portions of the arms of the locking member or spider engage the lugs or projections on the underside of the sealing ring. When in this position

the arms of the locking spider can move freely upwardly between the lugs in the neck so that the combined closure can now be turned about the axis of its hinge pin and opened.

The arrangement provides a hinged cap with no loose parts and with uniform pressure on the seating when closed and it further provides an extremely quick action in opening and closing.

Further the rubber or other packing ring carried by the sealing ring does not rotate on the surface with which it engages when closing and in addition this ring has its inner and outer edges enclosed so that it will not be forced or spewed inwardly or outwardly.

The pressure retaining the closure in its closed position is transmitted by a simple helical spring placed centrally and the cam action terminates in a definite stop in both directions and does not rely upon friction for retaining the lock.

Dated the 9th day of June, 1941.

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PROVISIONAL SPECIFICATION
No. 2264 A.D. 1942.

Improvements in Closure Caps for Fuel Tanks and like Containers

We, THOMAS CARLYLE ELLISON ROWLAND, of 49, Silhill Hall Road, Solihull, in the County of Warwick, and HARRY PARKER, of 71, Hazelhurst Road, Kings Heath, Birmingham, 14, in the County of Warwick, both British Subjects, do hereby declare the nature of this invention to be as follows:—

This invention relates to closure caps primarily for the filler openings of tanks, such, for instance, as vehicle radiator tanks and vehicle fuel tanks.

The present invention concerns improvements in the apparatus disclosed in our prior Provisional Specification No. 7435/41, wherein we have described a closure cap which includes a sealing ring adapted to engage with the end of the neck of the opening, a cap rotatably mounted on or in the ring and adapted to seat thereon and having a shank extending therethrough, a locking member mounted on the shank so that it turns therewith, and a spring acting between the locking member and an abutment on the shank, the locking member being adapted to engage under lugs projecting inwardly in the neck of the opening with a cam action when the cap is turned in the appropriate direction, so as to move the locking member in an axial direction and cause the spring to press the cap and the sealing ring to form pressure engagement with their seatings.

The object of the present invention is to simplify the construction and to provide a construction which can be more easily produced.

According to the present invention, the locking member instead of sliding on the shank is pivotally mounted thereon.

The locking member is acted upon by a spring, which may be a torsion spring, mounted on the pivot pin by which the locking member is attached to the shank.

In a convenient arrangement the neck of the opening is provided with two diametrically spaced inwardly projecting lugs, and in such an arrangement the locking member takes the form of a pair of levers pivoted to downwardly projecting spaced lugs which replace the shank disclosed in the prior Specification.

The pair of levers now forming the locking member may each be of **U** shape, and the two arms of each of these members are mounted on opposite ends of a pivot pin supported in the lugs which now constitute the shank.

The outer portions of the two levers are formed as curved cam surfaces similar to the cam surfaces on the sliding member described in the previous Specification, each of the cam surfaces terminating in a stop to limit the rotary movement of the cap, and each of the levers now forming the locking member being adapted to engage a downwardly projecting stop formed on the sealing ring member, so that the rotary motion of the cap is limited in both directions.

The spring acting on the two levers now constituting the locking member is mounted on the pivot pin in between the two lugs which now constitute the shank, and the ends of the spring act one on each of the levers which are provided with webs for being engaged by the ends of the spring.

Normally the torsion spring is tending to swing the levers upwardly so that they are kept in contact with the underside of

the sealing ring, and one pair of arms of the **U** shaped levers may be formed with co-acting stops so that their pivotal motion in a downward direction and relatively to each other is limited. This prevents over-stressing of the spring.

In operation the appliance functions in the manner described in the previous Specification, the cap being closed by turning it on its pivot and then rotating the cap about its own axis, causing the cam parts of the locking levers to engage under the lugs in the neck of the opening. This draws the two levers downwardly and stresses the torsion spring, the pressure thus being transmitted resiliently through the pivot pin to the shank associated with the cap, so that the cap is pulled down firmly on to the sealing ring, and the sealing ring is pulled down firmly on to the edge of the neck.

The features of construction, such, for instance, as the hinge by which the cap is connected to the lug on the neck, and the construction of the sealing ring, remain unaltered.

Dated the 17th day of February, 1942.

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COMPLETE SPECIFICATION

Improvements in Closure Caps for Fuel Tanks and like Containers

We, THOMAS CARLYLE ELLISON ROWLAND, of 49, Silhill Hall Road, Solihull, in the County of Warwick, and HARRY PARKER, of 71, Hazelhurst Road, Kings Heath, Birmingham, 14, in the County of Warwick, both British Subjects, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to closure caps primarily for the filler openings of tanks, such, for instance, as vehicle radiator tanks and vehicle fuel tanks.

The object of the present invention is to provide an improved construction.

According to the present invention we provide a closure cap for tanks and like containers comprising a non-rotating sealing ring hinged to a fitting applied or adapted to be applied to the container opening, the ring being adapted to seat on the neck of said fitting, a cap mounted in an opening in the ring for turning movement, co-operating means on the cap and the fitting for producing axial movement of the cap when it is turned on its axis so as to seal the joints between the cap and the ring and between the ring and the fitting, wherein the cap is provided with a hollow shank or portion extending through the sealing ring, this shank or portion containing a spring engaging an abutment in the shank, and the shank is provided with a longitudinal slot, and a locking member in the form of a slide is mounted on said shank or portion and has a bridge piece extending through the slot and engaging the spring, or wherein a locking member comprising a pair of levers is hinged to a shank portion of the cap which extends through the sealing ring, a spring being provided operating between these levers and the shank portion of the cap.

The locking member may be slidably mounted on the shank or it may be pivoted thereto, in which case its free end or ends can move axially or approximately axially in relation to the shank.

When fastening the closure and also when unfastening it, the locking member preferably moves against a definite stop so that the operator can tell when the fastening or unfastening movement is complete. In the one case the stop may be formed on the operative parts of the locking member coming into engagement with the sides of the lugs in the neck of the container opening, and in the other case the operative parts of the locking member come into engagement with projections provided on the underside of the sealing ring.

The sealing ring is hinged to the neck of the container opening but preferably the hinge permits floating movement of the sealing ring in an axial direction so that the sealing ring can press evenly with uniform pressure around the seating provided on the neck of the opening.

Referring to the drawings:—

Figure 1 is a sectional view in side elevation showing one construction.

Figure 2 is a sectional view on line 2—2 of Figure 1.

Figure 3 is a sectional view of the sealing ring.

Figure 4 is a sectional view in side elevation of another construction.

Figure 5 is a section on line 5—5 of Figure 4.

Figure 6 is a view similar to Figure 5

but showing the closure in its closed position.

Figure 7 is a section on line 7—7 of Figure 6.

In the constructions illustrated, the neck 10 of the fitting 11 applied to the tank opening is of cylindrical form and its edge 12 is machined and forms a seating adapted to be engaged by a rubber or other ring 13 carried by the sealing ring 14.

The fitting 11 is further provided with an exterior lug 15 through which extends a slot 16, the centre line of which is parallel to the axis of the fitting 11, the slot extending horizontally through the lug and receiving a pin 17 carried by a pair of lugs 18 on the sealing ring 14, the arrangement being such that the sealing ring 14 can pivot on a horizontal axis, but the axis is movable up and down to a limited extent so that the sealing ring can seat itself accurately on the edge 12 of the neck 10.

The neck 10 of the fitting 11 as shown in Figures 1 to 3 is further provided with a plurality of (say three) inwardly projecting lugs 19. These lugs are situated all on the same level and are spaced equally around the wall of the fitting 11. Further, they are situated a short distance below the edge 12 of the neck 10. Each of these lugs in the plan view has one side 20 which is substantially radial and the opposite side 21 may converge towards the radial side proceeding inwardly. The radial side 20 of each of these lugs is adapted to be engaged by an operative part on the locking member and to form a stop therefor when the closing movement is complete.

On their undersides each lug may be of somewhat convex or rounded form, these convex portions being arranged radially and being adapted to be engaged by cam surfaces forming the operative parts of the locking member.

The sealing ring 14 is formed as a metal ring having a pair of lugs 18 at a suitable position carrying the pivot pin 17 engaging in the slot 16 in the lug 15 on the exterior of the fitting 11.

On its underside the sealing ring is provided with an annular groove 22 of rectangular section which receives the packing ring 13 of synthetic rubber or other suitable material. The metal sealing ring is provided with a flange 58 adjacent the groove which receives the rubber ring, which flange engages under the inner periphery of the rubber ring and retains it in position. The packing ring 13 is thus housed in the metal sealing ring so that it cannot come loose and both its inner and outer edges are supported by the inner and outer edges of the annular groove 22 in the metal sealing ring. A portion of the undersurface of the packing ring is exposed and engages with the edge 12 of the fitting 11 on the tank.

The metal sealing ring is further provided with a central cylindrical opening 23, and on its underside this metal sealing ring is provided with a plurality of lugs 24 projecting downwardly, which lugs form stops for the locking member when it is moved to the released position.

The stops 24 are formed on the underside of the sealing ring, and adjacent the operative face of each stop the underside of the ring is provided with an inclined recess 59.

Rotatably mounted in the central opening in the sealing ring is a cap 25. This cap is constructed with a flange 26 at the top, the periphery of which is shaped so that it can be gripped firmly for turning. This cap is provided with a central downwardly extending hollow shank 27, the middle part 28 of which is of non-circular, say square, section. This shank is provided with a vertical slot 29 extending from its lower end upwardly to a suitable shoulder.

Further, on its underside the flange 26 of the cap 25 is provided with a rectangular groove 30 which receives a packing ring 31 which may be made of graphited asbestos. This packing ring 31 is adapted to engage the upper side of the sealing ring 14. Instead of providing the flange 26 of the cap 25 with a groove 30 containing a packing ring 31, the groove and packing ring may be omitted and the packing ring at this position may be provided with an annular integral facing of metal adapted to co-operate with the upper surface of the sealing ring.

The locking member 32 is formed as a spider having a number of radially extending arms 33, the number corresponding with the number of lugs 19 provided in the neck of the tank opening.

The locking member is slidably mounted on the shank 27 of the cap, and at its upper side it is provided with a bridge portion 34 which enters the slot 29 in the shank of the cap, this bridge portion on its underside having a central projection 35 for positioning the spring 36.

Each of the arms 33 of the locking member or spider has a cam surface on its upper side, and each cam presents to the convex portions on the underside of the corresponding lug 19, first an incline 37 and then a slight declivity 38, and finally a definite stop 39 formed by a

radial rib on the arm of the locking spider. Thus when the spider is turned so as to engage under the neck lugs 19, the locking spider is drawn downwardly until a definite stop position is reached, in which each declivity 38 is engaged by one of the convex portions on the undersides of the lugs 19 on the neck.

The fit of the locking member 32 on the shank 27 is preferably a slack fit so as to allow the locking member a limited floating or slight rocking movement permitting all the cam surfaces 37, 38 properly to engage their lugs 19.

After the locking spider has been placed in position on the shank, a coiled spring 36 is placed in the hollow shank 27, the upper end of the spring engaging the underside of the bridge portion 34 of the locking member or spider.

A plug 41 is inserted in the lower end of the hollow shank 27 and forms an abutment for the lower end of the spring. This plug may be provided with a central projection 42 on its upper side for positioning the spring, and the plug may be retained in position by a cross pin 43.

With the arrangement described, if the compound structure including the sealing ring, cap and locking member or spider is turned into the closed position and the cap given a part turn, the arms of the locking spider engage under the lugs in the neck so that the locking spider is drawn downwardly thus loading the spring. The load of the spring is transmitted to the shank of the cap because the lower end of the spring engages the plug in the hollow shank of the cap, and in this way the cap and the sealing ring are drawn downwardly resiliently causing them to form sealed joints with each other and with the fitting on the container.

When unfastening the closure, the cap is given a part turn in the reverse direction until portions of the arms of the locking member or spider engage the lugs or projections on the underside of the sealing ring. When in this position the arms of the locking spider can move freely upwardly between the lugs in the neck so that the combined closure can now be turned about the axis of its hinge pin and opened. When the cap is turned in the reverse direction as described, the spider or locking member makes a helical movement about the axis of the cap in an upward direction, and the upper surfaces of the stops 39 enter the inclined recesses 59 and may bind thereon, so that the cap is thus retained in the unlocked position until it is again operated.

In the construction shown in Figures 4 to 7, the neck 10 of the fitting 11 secured over the opening 12 is provided with two diametrically spaced inwardly projecting lugs 44, and the locking member takes the form of a pair of levers 45 pivoted by a pin 46 to downwardly projecting spaced lugs 47 which form a shank formed on the cap 25.

The pair of levers 45 which form the locking members are of **U** shape, and the two arms 48 of each of these members are mounted on opposite ends of the pivot pin 46 supported in the lugs 47 which constitute the shank.

The outer portions 49 of the two levers 45 are formed with curved cam surfaces 50 similar to the cam surfaces on the sliding member described with reference to Figures 1 to 3, each of the cam surfaces terminating in a stop 51 to limit the rotary movement of the cap, and each of the lever 45 forming the locking member being adapted to engage a downwardly projecting stop 52 formed on the sealing ring, so that the rotary motion of the cap is limited in both directions.

A torsion spring 53 acting on the two levers 45 is mounted on the pivot pin 46 in between the two lugs 47 which constitute the shank, and the ends 54 of the spring act one on each of the levers 45 which are provided with webs 55 for engagement by the ends of the spring.

Normally the torsion spring 53 is tending to swing the levers upwardly so that they are kept in engagement with the underside of the sealing ring, and one pair of arms 48 of the **U** shaped levers is formed with co-acting stops 56, 57, so that their pivotal motion in a downward direction and relatively to each other is limited. This prevents over-stressing of the spring.

In operation the appliance functions in the manner described with reference to Figures 1 to 3, the cap being closed by turning it on its pivot and then rotating the cap about its own axis, causing the cam parts of the locking levers to engage under the lugs in the neck of the opening. This draws the two levers 45 downwardly and stresses the torsion spring 53, the pressure thus being transmitted resiliently through the pivot pin 46 to the shank associated with the cap, so that the cap is pulled down firmly on to the sealing ring, and the sealing ring is pulled down firmly on to the edge of the neck.

Both constructions provide a closure including a non-detachable cap with no loose parts and with a sealing ring which engages its seating with a uniform pressure over the whole area. Moreover the sealing ring does not rotate when the cap is operated into the closed position

so that there is no sliding action between the metal at the edge of the neck and the rubber packing.

The packing in the sealing ring has its inner and outer edges enclosed so that it is not possible for it to become forced out inwardly or outwardly.

Further, both arrangements provide a closure which has an extremely quick action both in opening and closing.

The pressure retaining the closure in its position is transmitted by a spring in both constructions, and this spring is placed centrally, while the cam action in both constructions terminates in a definite stop, both when the closure is open and when it is closed. The cam does not rely upon friction for retaining the lock when closed.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A closure cap for fuel tanks and like containers, comprising a non-rotating sealing ring hinged to a fitting applied or adapted to be applied to the container opening, the ring being adapted to seat on the neck of said fitting, a cap mounted in an opening in the ring for turning movement, co-operating means on the cap and the fitting for producing axial movement of the cap when it is turned on its axis, so as to seal the joints between the cap and the ring and between the ring and the fitting, wherein the cap is provided with a hollow shank or portion extending through the sealing ring, this shank or portion containing a spring engaging an abutment in the shank, and the shank is provided with a longitudinal slot, and a locking member in the form of a slide is mounted on said shank or portion and has a bridge piece extending through the slot and engaging the spring, or wherein a locking member comprising a pair of levers is hinged to a shank portion of the cap which extends through the sealing ring, a spring being provided operating between these levers and the shank portion of the cap.

2. A closure cap according to Claim 1, wherein the sealing ring is floatingly hinged to the fitting or neck surrounding the opening.

3. A closure cap according to Claim 1, wherein the levers are of U shape and are hinged to a pin which is disposed transversely to the axis of the cap and is carried by the shank portion of the cap, and wherein the spring is a torsion spring engaging the pin and having its ends engaging under the levers.

4. A closure cap according to Claim 3, wherein stops are provided on two of the levers to limit the extent to which the spring can be loaded.

5. A closure cap according to any of the preceding claims, wherein the means to produce axial movement of the cap comprises co-operating cams and abutments provided respectively on a locking member mounted on the shank of the cap, and on the neck or fitting applied to the container, including locating means on the cams and abutments determining the locked and unlocked positions.

6. A closure cap for fuel tanks and like containers, substantially as described and shown in Figures 1 to 3 or in Figures 4 to 7 of the accompanying drawings.

Dated the 8th day of June, 1942.

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546,775 AMENDED SPECIFICATION

SHEET 1

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

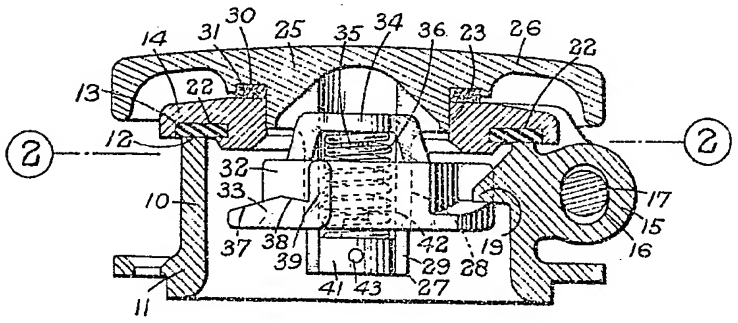


FIG. 2.

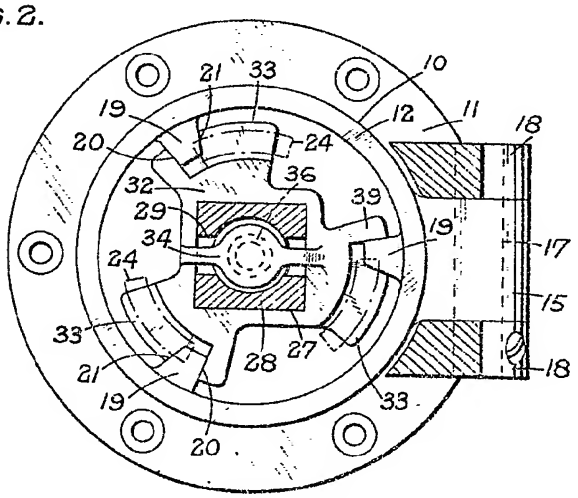


FIG. 3.

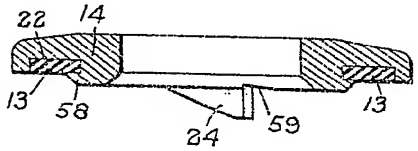
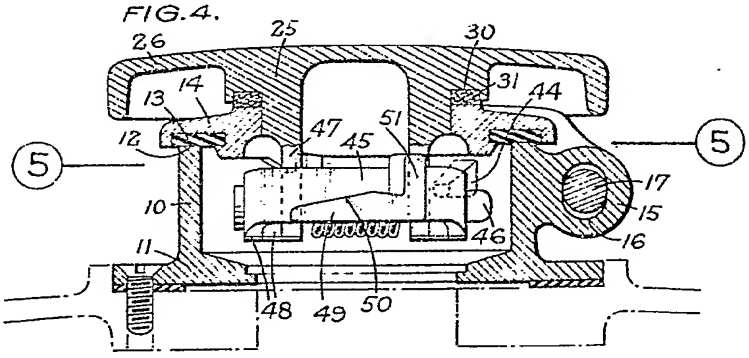


FIG. 4.



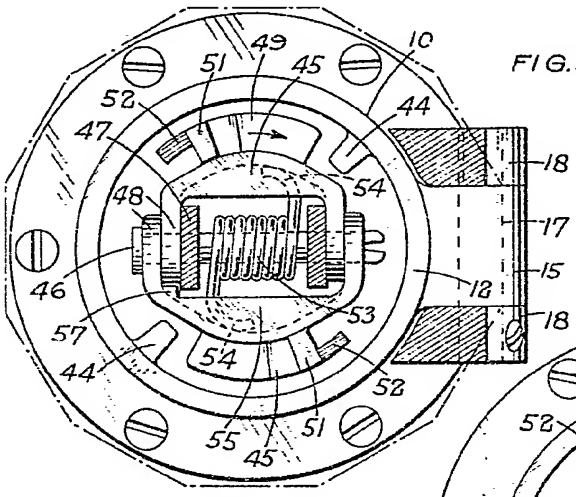


FIG. 5.

FIG. 6

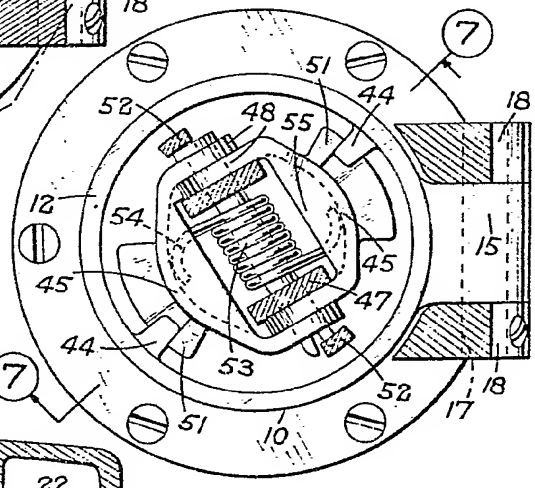
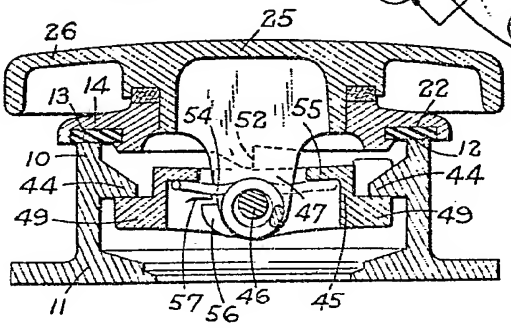


FIG. 7.



546,775 AMENDED SPECIFICATION

SHEET 1

[This Drawing is a reproduction of the Original on a reduced scale.]

FIG. 1.

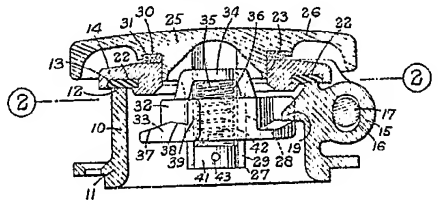


FIG. 2.

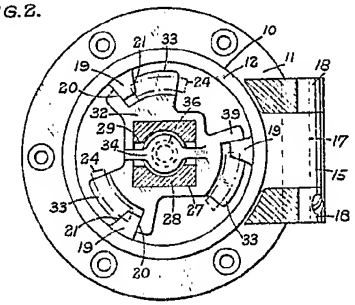
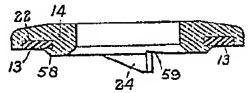


FIG. 3.



2 SHEETS

SHEET 2

FIG. 4.

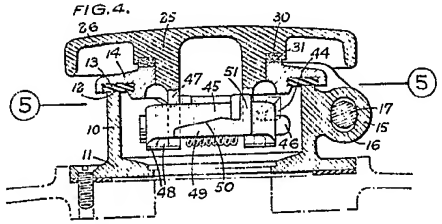


FIG. 5.

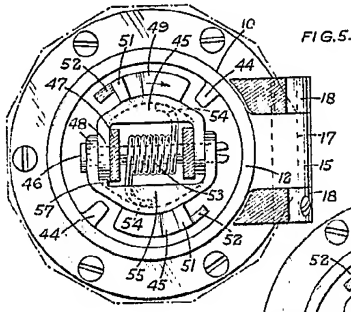


FIG. 6.

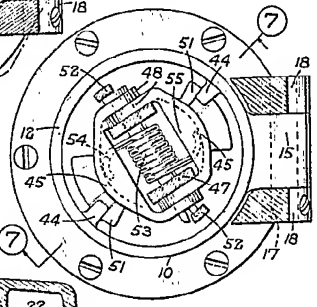
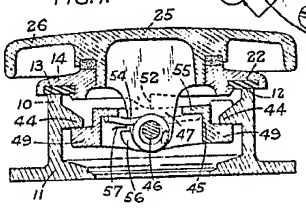


FIG. 7.



H.M.S.O. (Ty. P.)